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conductors, each of the conductors being separately insulated, an insulation sheath surrounding the twisted pair of conductors and a tensile load carrier surrounding the insulation sheath, the load carrier comprising a sheath of tensile load carrying filaments.

13. A method according to claim 12 wherein the transmitting and receiving the signal are accomplished using complimentary signal modems.
14. A method according to claim 13 wherein the signal is encoded and decoded using decoding methods selected from the group consisting of (i) QAM, (ii) CAP, and (iii) DMT.

REMARKS

Claims 1-14 are pending in the application. Claims 1-14 stand rejected by the Examiner. The specification has been amended with this response. The claims have been amended, and proposed corrections to the drawings are presented. No new matter has been added by the amendments. Reconsideration of the application, as amended, is respectfully requested. The Examiner's objections rejections are addressed in substantially the same order as in the referenced office action.

OBJECTIONS TO THE DRAWINGS

The Examiner objects to Figure 4 as lacking descriptive labels. Applicant submits

herewith a copy of Figure 4 with pen and ink corrections made thereon for consideration. Applicant respectfully submits that the corrections overcome the basis of the Examiner's objections.

The Examiner objects to the drawings as not showing the feature of "seven twisted pairs of insulated conductors" as claimed in claim 6. Applicant submits herewith a copy of drawing sheet 3 with pen and ink changes to add Figure 3A for consideration. Figure 3A has been added to the drawing sheet showing original Figure 3 to show the center conductor 302 of Figure 3 as a twisted pair. When the center conductor shown in Figure 3 is a twisted pair, then there are 7 twisted pairs of conductors as claimed in claim 6. Support for the drawing change is found in claim 6 as filed, and in the specification in the paragraph beginning at page 15 line 17. The paragraph has been amended to reconcile the description with the reference numerals 302a and 302b as required by the Examiner. Thus, no new matter is added. Applicant respectfully submits that the corrections overcome the basis of the Examiner's objections.

OBJECTIONS TO THE SPECIFICATION

The Examiner objects to the specification as failing to provide proper antecedent basis for the claimed subject matter. Specifically, the Examiner concludes that the embodiment of the invention with the feature of seven twisted pairs of conductors as claimed in claim 6. Applicant respectfully disagrees. While the Examiner might have a basis for concluding that the drawings did not show the feature, the subject matter claimed in claim 6 was clearly described in the paragraph beginning at page 15 line 17. Applicant clearly describes in the paragraph, as originally filed, that the center conductor could be

replaced with a twisted pair. Thus the embodiment of Figure 3 would have seven twisted pairs of conductors.

The amendment to the paragraph made with this response is for the sole purpose of entering the new reference numerals 302a and 302b necessitated by the Examiner's objection to the drawings. No new matter is added, and the description, as filed, provided adequate support for the claim..

35 USC § 103 REJECTIONS

Claims 1 - 14 stand rejected under 35 USC § 103(a) as being unpatentable over Matthews(US 5,148, 408) in view of Bowers (US 3, 259,675). Applicant has amended independent claim 1 and 12 to clarify the element relating to a twisted pair of insulated conductors. Applicant respectfully traverses the rejection of independent claim 7, because the Examiner has failed to present a prima facie case of obviousness.

The present invention is directed toward using twisted wire pairs in a logging cable to increase the bandwidth of the cable. Each of the independent claims includes either a method or apparatus limitation of a "twisted pair of signal conductors, each of the conductors being separately insulated." Independent claims 1 and 12 were amended to clarify the limitation as being the same limitation in original independent claim 7.

The term "twisted pair" is a notoriously well known term in communications fields outside of the well logging fields that means two individually insulated conductors grouped together in a spiral pattern. Applicant reiterates the known meaning beginning at page 10 line 19, i.e, "A cable **100** includes a twisted pair of insulated conductors **102** and **104**

helically twisted together and about a central axis of the cable. Each of the insulated conductors 102 and 104 comprises a group of electrically conductive stranded wires 106 encased by a tightly fitted, tubular sheath of insulating material 108." Furthermore, it is only with the benefit of Applicant's disclosure that one skilled in well logging could practice a well logging cable having twisted pair conductors to increase bandwidth.

The Examiner cites Bowers for teaching a twisted pair logging cable. Bowers however, has no teaching at all of a twisted pair wire as that term is defined in the present applicant and as known by those skilled in communications arts. Referring to Figure 2 and column 4 lines 67+, Bowers teaches only what is now a well-known 7-conductor logging cable. Taught is a 7-conductor cable having with "six outer insulated conductors 17 wound with a left-hand lay in spaced apart relationship about the central axis and away from the central insulated conductor 21." Applicant adds emphasis to show that bowers does not describe any conductor 17 as being in a twisted pair configuration. Applicant respectfully submits that taking any pair of the six outer conductors, as suggested by the examiner, does not result in a "twisted pair" as described and claimed in the present application. No two conductors 17 of bowers are twisted together, because Bowers shows and expressly states that the conductors are in "spaced apart relationship about the central axis."

Applicant respectfully submits that the Examiner has not presented a prima facie case of obviousness, because no cited reference or combination teaches "a twisted pair of signal conductors, each of the conductors being separately insulated" as found in original claim 7. Since claims 1 and 12 have been amended to include the same structural limitation, these claims likewise include at least one element not taught by the art of record.

Therefore, Applicant respectfully submits that independent claims 1, 7 and 12 are not rendered unpatentable by any combination of art of record.

VERSION WITH MARKINGS TO SHOW AMENDMENTS

Please the description of Figure 3 found at page 10 lines 9-10 with the following:

[Figure 3 is]Figures 3 and 3A show a cross section view of a 7-conductor cable configuration according to the present invention.

Please replace the paragraph beginning at page 15 line 17 with the following”

In this configuration, center conductor **302** is shown as a single conductor. However, the intent is not to exclude the use of a twisted pair for the center conductor shown as conductors **302a** and **302b** in **Figure 3A**. Also, the preferable mode for the twisted pair wires is the single conductor mode where the ends are electrically connected, but the differential mode may be preferable in a particular application. As known in the art, any conductor may carry both data and power simultaneously.

The claims are amended as follows:

1. (Amended)A well logging system comprising:
 - (a) a downhole well data sensor;

- (b) a downhole data transmitter;
- (c) a surface data receiver; and
- (d) a data transmission cable linking the transmitter and the receiver, the cable having at least one twisted pair of signal conductors, each of the conductors being separately insulated[pair of insulated conductors wound in a substantially helical twist], an insulation sheath surrounding the twisted pair of conductors and a tensile load carrier surrounding the insulation sheath, the load carrier comprising a sheath of tensile load carrying filaments.

Claims 2-11 are not amended.

12. (Amended)A method of transmitting a signal from within a well borehole to a surface location comprising:
- (a) transmitting the signal with a downhole data transmitter;
 - (b) conveying the signal on a data transmission cable linking the transmitter and to a surface receiver, the cable having at least one twisted pair of signal conductors, each of the conductors being separately insulated[pair of insulated conductors wound in a substantially helical twist], an insulation sheath surrounding the twisted pair of conductors and a tensile load carrier surrounding the insulation sheath, the load carrier comprising a sheath of tensile load carrying filaments.

Claims 13 and 14 are not amended.

CONCLUSION

For all of the foregoing reasons, applicant submits that the claims are allowable over the prior art of record. A fee of \$ 110 is believed due for the extension of time associated with filing this paper. The Commissioner is hereby authorized to charge the fee due for this response and to credit any overpayment to Deposit Account No. 02-0439 (664-23196-US).

Respectfully submitted,

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